Concordia UNIVERSITY

FALL 1994

The Affiliate

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REAL EDUCATION FOR THE REAL WORLD

Rajnikant Patel is developing ways to avoid bumps in space

A helping hand for the Canadarm

BY SYLVAIN COMEAU

Electrical Engineering Professor Rajnikant Patel's current research may reach far beyond the confines of the Electrical and Computer Engineering Department's robotics lab where he does his work. With a research contract form Canadair, a division of Québec technology giant Bombardier, Patel is developing methodologies that will be used to develop the next generation of the Canadarm, part of NASA's 21st-century space station, Freedom.

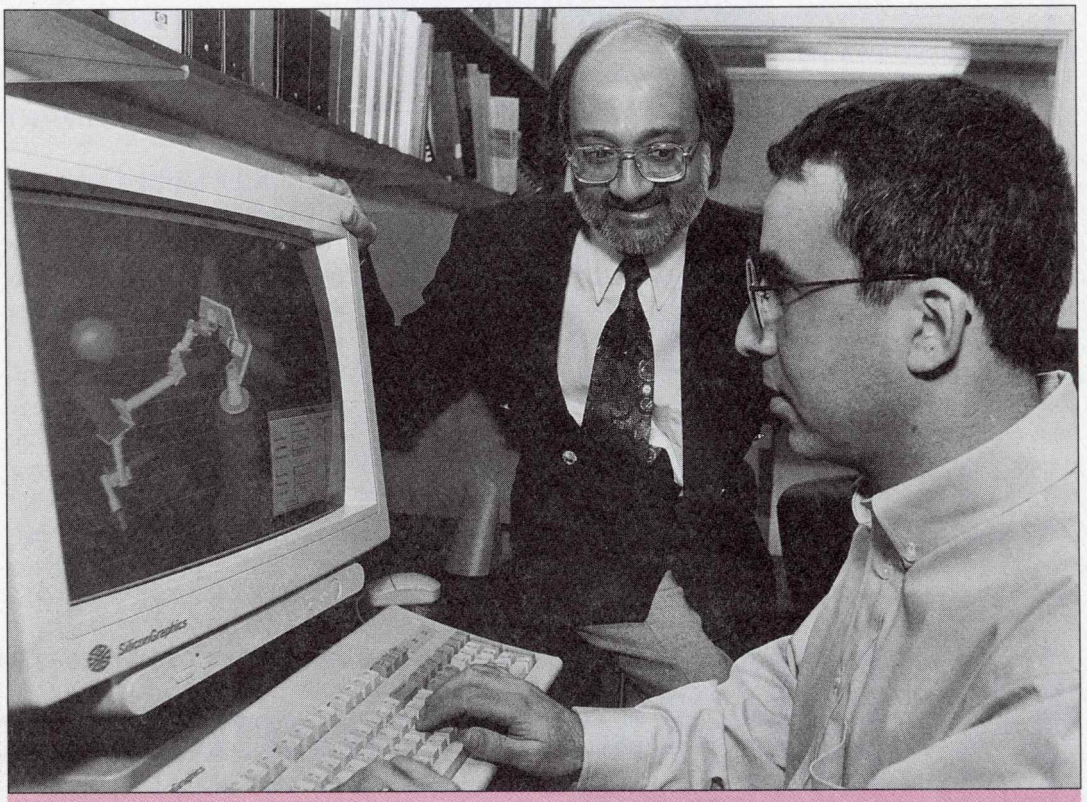

PHOTO: CLIFF SKARSTEDT

Professor Rajnikant Patel (left) watches as Electrical Engineering PhD student Farshid Shadpey controls a 3-D image of the space arm at work.

Robotics research

Patel's participation comes near the end of a long chain of command. The new Canadarm, also known as the Special-Purpose Dextrous Manipulator (SPDM), is being built by Spar Aerospace for NASA and the Canadian Space Agency. The work of Patel and others forms a part of the project under the Canadian government's STEAR (Strategic Technologies in Automation and Robotics) programme, which sponsors and organizes space-related robotics research. Patel is working on STEAR 5, which is aimed at developing trajectory planning and object avoidance technology.

"If a manipulator [robotics arm] is working in an environment where there are a lot of objects moving about, the idea is to develop a strategy in which it can accomplish its task without actually hitting anything. While the arm is cleaning a surface of an object on or near the space station, for example, it must not hit other arms or anything in its neighbourhood. Out in space, any kind of contact is critical."

Patel stresses that the job is hardly a one-man show; the work is being shared by a collaborative team made up of Patel, several of his graduate students, and three researchers from Bombardier.

"It is a very difficult challenge, both mathematically and in engineering terms, because we are doing cutting-edge robotics research. Only a team can accomplish that."

Two arms working together

In an unrelated project funded by the Natural Sciences and Engineering Research Council (NSERC), Patel developed a robot arm with colleague Jorge Angeles of McGill's Centre for Intelligent Machines. He plans to demonstrate the effectiveness of the methodologies developed for the STEAR 5 project on two such arms working together.

The arm Patel co-developed with Angeles is a "redundant arm," meaning that "it enjoys more degrees of freedom than are required for a particular task. The SPDM is also a redundant arm. We may, therefore, be able to show how the methodologies we have developed would work on a space arm with approximately the same complexity."

Les Landsberger exploring new frontiers

Improving silicon, the raw material of microchips

BY HEIDI MILLER

In one of the basement rooms of the Henry F. Hall Building, a small group of electrical engineering researchers is working to increase the odds that Canadians will catch up in the race to develop the best, fastest, and smallest silicon chip.

They're doing it in a still-expanding lab called the Microelectronics Device and Fabrication Laboratory, which was put together in two years.

"There's a lot more value in there than actual money spent," said Electrical and Computer Engineering Professor Les Landsberger, who, along with Technical Officer Mojtaba Kahrizi, is responsible for setting up the lab.

What could have set back the Faculty close to $1 million has cost considerably less, Landsberger said.

"Because I know people in California, I was basically able to go around and scrounge for good deals and refurbished equipment, and get donations."

Hands-on experience

On top of giving students hands-on experience with integrated circuit fabrication, work at the lab focuses on the development of better silicon microchips through different manufacturing processes.

Silicon wafers – from which the chips are created – are made of the same stuff as sand. Etched in these wafers are grids of repeated patterns carrying the information that makes a computer carry out orders. Each of the grid's fingernail-sized squares is a silicon chip, with a complicated maze of electronic yes/no responses that makes up a computer's brain. How fast and how well these mazes handle information depends on many things, including the smoothness and structural integrity of materials.

That's where Landsberger comes in.

A standard microprocessing chip is made up of many layers, he explained, including a bottom silicon layer covered in turn by silicon dioxide. Landsberger focuses on the dioxide layer.

In a specially ventilated and dust-free section of the lab, researchers are working on "growing" better silicon dioxide and on finding a way to make it more uniform and reliable. It's painstaking, but never boring, said Landsberger. Even precision work can result in the unexpected. And these surprises can be pleasant, opening doors to new research.

He compares the state of research in this field with the excitement that was generated by the discovery of lasers years ago. And Landsberger's lab is right out there, exploring these new frontiers. A

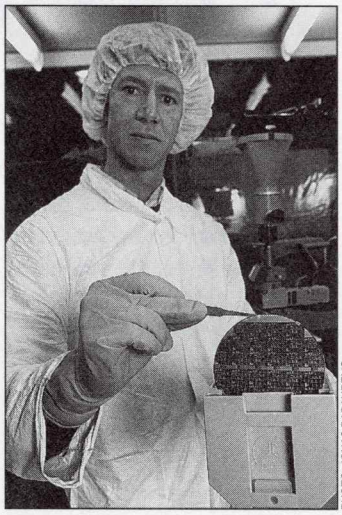

PHOTO: JONAS PAPAURELIS

Professor Les Landsberger holding an industry fabricated wafer that will undergo testing at Concordia as part of the joint project in advances in semiconductor processing.

PHOTO: JONAS PAPAURELIS

Professor H.T. Hayn from the University of California at Los Angeles (left) confers with Concordia Professors S.V. Hoa and Stanley Kubina at inaugural meeting of the Industrial Advisory Committee of CONCOM last May.

Acoustics and composites conferences held here

Sound and fury

BY SYLVAIN COMEAU

Inquisitive minds never rest; perhaps that is why two Concordia professors organized well-attended conferences during the lazy, hazy days of summer. Both attracted the high priests of their respective professions to large-scale, three-day events in muggy Montréal.

Richard Guy, who teaches building acoustics, building science and thermodynamics at the Centre for Building Studies, organized the Third International Congress on Air and Structure-Borne Sound and Vibration at the Château Champlain in June, sponsored by Concordia and others. Over 200 speakers presented papers, including a group of 40 Russian experts.

Leading the field

In Guy's specialty of room-acoustics measurement, he was somewhat surprised to find that he is leading the field with a device he invented, the 3-D intensity assessor.

S.V. Hoa, a Concordia professor of Mechanical Engineering, organized the International Conference on Design and Manufacturing Using Composites at the Holiday Inn Crowne Plaza in August. The conference was the third in a series since 1987 organized by Hoa and the organizations he founded, the Concordia Centre for Composites (CONCOM) and the Canadian Association for Composite Structures and Materials. Advanced materials and composites have been Hoa's field of expertise for the past 15 years. A

Engineers finish sixth in North American competition

Running on empty

BY ALLAN KUNIGIS

Electra, the hybrid electric car that competed in 1993 and 1994, with Larry Marandola, Andy Parakis (Ford representative), Jose Dibenedetto, John Theofanopoulos, Harry Kekedjian, George Metrakos, Luciano Martin, Bruno Forcione, Byung Son, Achilles Nikopoulos, Professor Tadeusz Krepec (faculty advisor), Dennis Dionatos and A.J. Whitman.

Will the gas-guzzlers that choke our streets ever be replaced by cars that are clean and quiet? Concordia's Engineering students are doing their bit to make it happen.

Every spring, they take part in design competitions sponsored by the automotive industry, testing vehicles that have been converted to such cleaner fuels as methanol, natural gas and electricity.

Concordia teams finished first in 1992, second in 1989 and third in 1991 and 1993 – not bad for a university with modest financial resources.

Concordia's converted 1994 Saturn finished sixth out of 18 at the most recent Hybrid Electric Vehicle (HEV) Challenge, which was held this summer in Detroit, Michigan.

"We have a $30,000-$40,000 budget, compared to more than $200,000 for some competitors," said Mechanical Engineering Professor Tadeusz Krepec, who advises the team. "We have to alter the design to be better. We avoid going into very expensive high-tech solutions. It shows our creativity."

"We didn't do as well as the previous year, but we still outperformed most of our competitors." The problem was an air-cooled engine that was adversely affected by the 98-degree heat.

Other contests in which Concordia's Mechanical Engineering students participate include the Mini Baja Buggy, Supermileage (aimed at minimizing fuel consumption), Formula SAE (Society of Automotive Engineers), Aerodesign, and Walking Robot competitions.

The teams work in the Henry F. Hall Building garage during the day, in the evening and on weekends, if necessary. As soon as one project ends, work on the next one begins.

Students are already preparing their 1995 Chrysler Neon for next year's Hybrid Electric Vehicle Challenge. Unlike the 1994 Saturn, which alternated between electricity and gasoline, the Neon will use natural gas and electricity. This combination will result in a cleaner performance, but the double conversion represents an even greater challenge for the students.

Winning is nice, but the experience of working with the alternative fuel systems is what's important, Krepec said. "It shows students that there are big advantages in converting their knowledge to applications. The practical experience gives them a better chance of being hired once they graduate." A

Four Networks with Concordia connection selected for Phase Two funding

BY HEATHER PATENAUDE

All four Networks of Centres of Excellence (NCE) with Concordia involvement which applied for Phase Two funding from the federal government have been successful.

The Concordia-affiliated projects are: the Institute for Robotics and Intelligent Systems (IRIS), involving Concordia Professors Ching Suen and Rajnikant Patel; the Canadian Institute for Telecommunications Research (CITR) with Professors Jerry Hayes and Tho Le-Ngoc; Micronet-Microelectric Devices, Circuits and Systems for Ultra Large Integration (ULSI) with Professor Eugene Plotkin and Neuro Regeneration and Functional Recovery Nework with Professor Roy Wise.

In total, 10 NCE projects have been renewed, with a total budget of $197 million.

Since its inception in 1989, the NCE programme has involved over 800 top researchers, 1,400 graduate students, 500 post-doctoral fellows, 35 universities, and 30 federal and provincial departments. The NCE is administered by the Natural Sciences and Engineering Research Council (NSERC), the Medical Research Council (MRC), and the Social Sciences and Humanities Research Council (SSHRC), in collaboration with Industry Canada. A

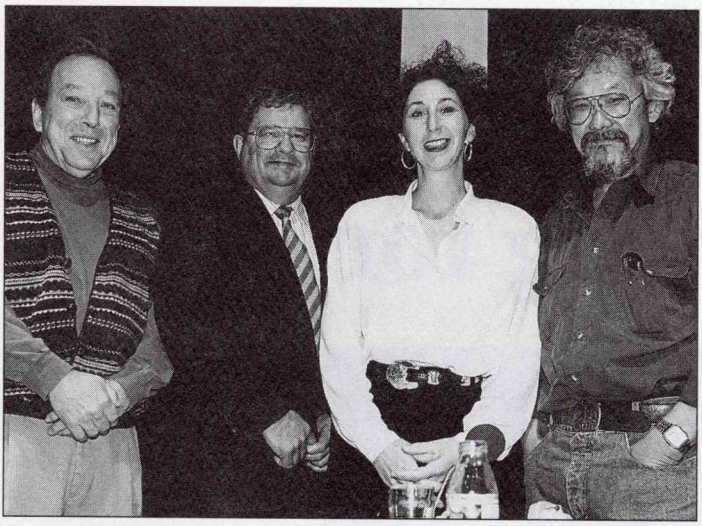

PHOTO: ANDREW SOONG

Homecoming '94 and Open House

Concordia's Open House featured exhibits from more than 50 units of the University while Homecoming '94 presented a variety of events aimed especially at alumni. The Homecoming Shrine Bowl drew over 7,000 football fans and both the Theatre Department's hit production of *Anne of Green Gables* and an evening with satirists Bowser and Blue were sell-outs. Special Open House and Homecoming guest speaker David Suzuki spoke to another full house as well as appearing on a special two-hour live CJAD broadcast of Melanie King's *On Target* show, direct from the J. A. DeSève Cinema in the J. W. McConnell Building Atrium. Also interviewed were Professors Graeme Decarie, Ron Rudin and Daniel Salée in a panel on the English in Québec; Dave Campbell (Sports Medicine Centre) and Nathaly Gagnon (Leisure Studies) on sports and domestic violence; Brian Smith (Psychology) on addiction; and Interim Rector Charles Bertrand. Photo (from the left): Decarie, Bertrand, King and Suzuki.

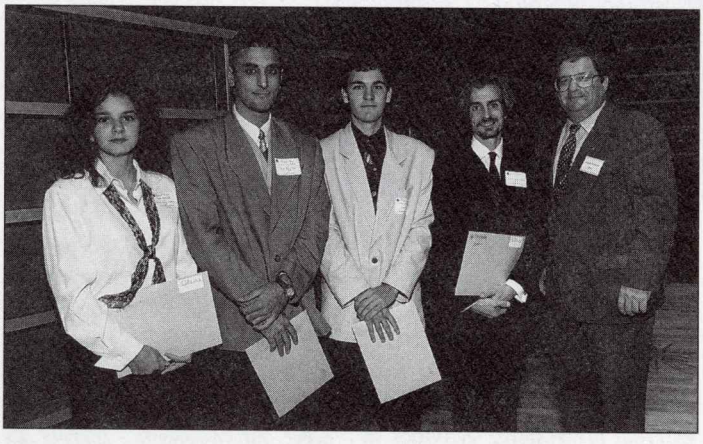

PHOTO: JONAS PAPAURELIS

Memorial Scholarships awarded

The Concordia Memorial Entrance Fund Scholarships, established in honour of Matthew Douglass, Michael Hogben, A. Jaan Saber and Phoivos Ziogas, the four professors slain at the University in August 1992, were awarded for the first time at an awards ceremony held in early October for undergraduate students.

Interim Rector Charles Bertrand presented (left to right) Nancy Orsini (Computer Science), Khajak Ishak (Mathematics and Statistics), Frédéric Gendron (Mathematics and Statistics) and Peter Fedun (Communication Studies) with certificates for $1,500 each.

The $100,000 endowment fund has been supported by members of the Concordia community across all the Faculties and University services, as well as by alumni and friends of Concordia across Canada in reaction to the tragic events of August 24. In all, more than 200 students received more than $250,000 in scholarship funds that evening.

Arthurs, Cowan Reports and Forensic Audit available

The Arthurs and Cowan Reports, as well as the Forensic Audit are available at the Public Relations Department, 1463 Bishop St., in Room BC-115. Please call ahead, (514) 848-4880.

The two Reports are also available electronically on Concordia's Campus-Wide Information Network (C-CWIN) (the University's Gopher server) under Administration Services - Public Relations.

Faculty Spotlight

Stanley Kubina (Electrical and Computer Engineering) has been named by the National Research Council of Canada to the Canadian National Committee for the Union Radio-Scientifique Internationale (URSI). This appointment is in connection with his co-chairmanship of the steering committee for the 1997 North American Radio Science Meeting, which will be held in Montréal in July 1997.

Sanjay K. Mazumdar, of the Mechanical Engineering Department, has won first prize, university graduate level, in a competition held by the Society of Plastics Engineers. His research paper was on the manufacture of elliptical springs for automobile suspension systems using laser-aided processing.

Bala Ashtakala (Civil Engineering) was featured in May issues of the *Journal de Montréal* and *La Presse* about the sorry state of our roads.

A day-long workshop on research ethics held by the Faculty of Engineering and Computer Science was reported in *The Gazette*. The workshop, which originated with **Hugh McQueen** (Mechanical Engineering), was addressed by Roland Doré, president of the Canadian Space Agency and a former president of École Polytechnique.

The Centre for Building Studies' work in air quality testing, done notably by **Radu Zmeureanu**, was recently mentioned in a real estate column in *The Financial Post*.

The business magazine *Les Affaires* published a feature article on **Ching Y. Suen** and his work with Bell Québec, using computers to recognize handwriting.

Denise Roig devoted one of her lively Living section columns in *The Gazette* to **Reach**, the popular science camp for children run by Engineering students from Concordia and McGill Universities.

A Message from the Interim Rector:

Concordia is moving forward

I am pleased to have this opportunity to address our alumni and friends in the pages of the Faculty Affiliate newsletter.

As you well know, this past year has been a turbulent one for us in many ways, and Concordia has had to bear more than its fair share of trials and tribulations in public.

However, the worst is behind us.

The temporary "freeze" that was placed on some of our research funding has been lifted. In response to deficiencies in administrative and budget controls raised in the Arthurs, Cowan and Forensic Audit Reports, new control mechanisms are being implemented in both our research and treasury operations, under the leadership of Hal Proppe, Interim Vice-Rector Institutional Relations and Finance. Mme. Jocelyne Debonville, a partner in the firm of Raymond, Chabot, Martin, Paré, has been appointed Associate Vice-Rector, Finance, for a special six-month term to evaluate the effectiveness of all treasury policies and procedures.

The University has established a task force to develop a new policy on contract research and a code of ethics applicable to all members of the Concordia community is being approved.

The Faculty of Engineering and Computer Science has established strict controls to monitor expenditure claims involving research grants and contracts and has instituted a requirement that full-time faculty provide regular reports of all paid and unpaid external professional activities to the Dean. The Faculty is working in close collaboration with the University's Office of Research Services.

More significantly, for the long-term, a search process is well underway to find qualified candidates for five senior administrative posts. In the meantime, a united interim team is continuing to put into place the action plan approved by the Board of Governors this summer.

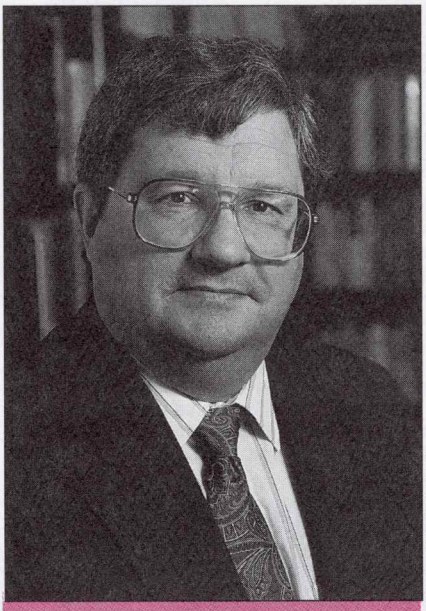

PHOTO: JONAS PAPAURELIS

Interim Rector and Vice-Chancellor Charles Bertrand

Organizational review

Concordia, like many of her sister universities across the country, faces new economic realities. Difficult choices must be made.

To ensure that these decisions are arrived at as rationally as possible, Concordia has undertaken an organizational review process to streamline its operations and reduce spending.

During this particular exercise a goal has been set to reduce expenditures by $11.5 million between now and 1999. The breakdown is $5.9 million in the academic sector (5.5 per cent of its budget) and $5.6 million in Concordia's administrative sector (10.5 per cent of its budget).

The underlying purpose of the review is to find ways to better serve our customers – namely the students who are the lifeblood of our existence.

The project's principal goals are to improve efficiency as much as possible, and ensure that sufficient operating funds are available in each of the next five years to fund new initiatives in priority areas – be they academic or capital expenditures.

Together, as a community, we will continue to move forward!

'...A united interim team is continuing to put into place the action plan approved by the Board of Governors.'

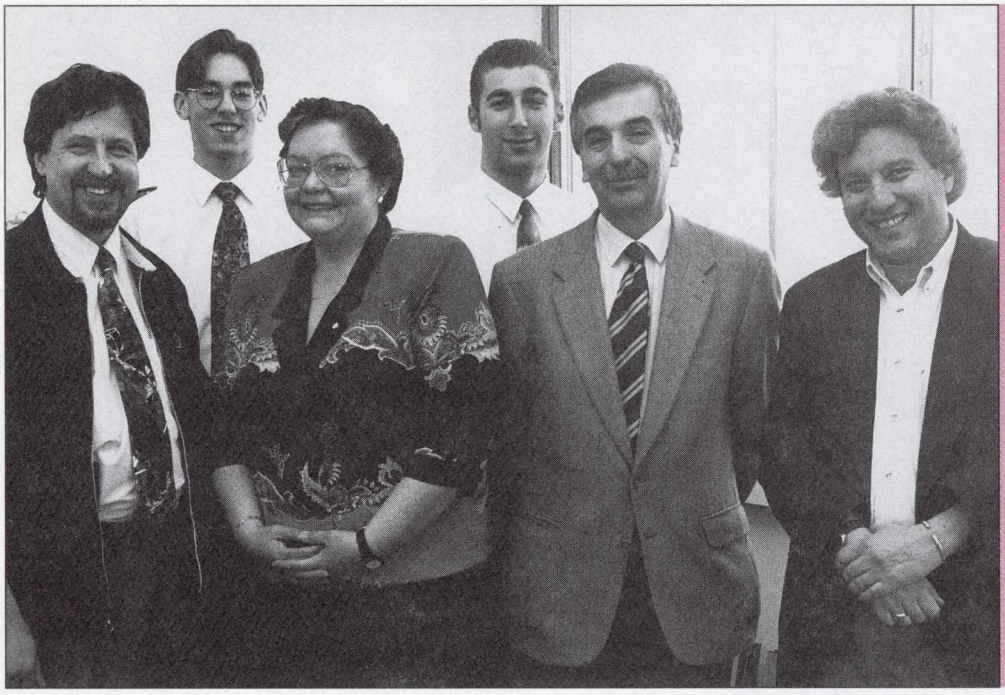

PHOTO: SUSAN MINTZBERG

Alabama-bound

The projects of three high-school science students, all from Royal West Academy, were chosen by Engineering and Computer Science faculty members and others from more than 180 entries at the recent Bell Montréal Regional Science Fair (BMRSF). The winning projects represented the BMRSF at the International Science and Engineering Fair in Birmingham, Alabama, recently.

Pictured in the back row before they left are students Michael Simkin and Biago Tambasso. In the front row, judges Rocco Iafigliola (Marianopolis College), Engineering Professor Corinne Jetté, Dean Donat Taddeo, and Morrie Bakerman, (Royal West). Missing is student Jay Pierrepoint. A project by Tambasso and Pierrepoint called "A Barrier for Sound" won first prize from the Acoustical Society of America.

Upcoming Events

January 25, 1995: Engineers of Tomorrow Conference

Young women from several Montréal-area high schools will spend the day touring the Faculty and learning more about Engineering as both an academic and career choice.

For more information, contact Natasha D'Souza at 848-7408.

February 9-12, 1995: 11th Annual Quebec Engineering Competition (QEC)

About 150 students from across the province will showcase their talents to industry and the public while competing for a chance to attend the Canadian Engineering Competition at the University of Alberta (Edmonton). For further information, contact the QEC organizing committee at 848-4535.

ECSCSL presents awards

PHOTO: SUSAN MINTZBERG

The Engineering and Computer Science Council on Student Life Awards were presented at a reception recently.

Standing, from left to right, are undergraduates Elizabeth Kyriakou, Christopher Malin and Daniel Leibu, Dean Donat Taddeo, Joseph Hulet (technical staff), graduate student Moataz El-Karmalawy, Rocco Lombardo (technical staff), Professor Steven Cheung (Civil Engineering), and undergraduates Stanley Yee and Tim Ishmael. Seated in the front are undergraduates Angelina Di Zanno, Kim Rokas and Student Affairs secretary Tazeta Taye. Student winner George Metrakos was away competing for Concordia in the alternative car challenge.

The Affiliate

The Affiliate, for supporters of the University's four Faculties, is published by the Faculty in association with the Office of University Advancement and the Public Relations Department.

The Faculty Affiliation Programme at Concordia University is a vehicle for recognition of important donors to the Annual Giving Programme. Different activities are planned for Faculty Supporters (donors of $100 or more per year), Faculty Associates (donors of $250 or more per year), and members of the Dean's Circle (donors of $500 or more per year), all of whom will receive *The Affiliate* on a regular basis.

Results of the Annual Giving Programme will be published in the *Concordia University Magazine*.

For further information, call the Office of University Advancement (514) 848-4856.